

DRAWING AMENDMENTS

Please replace the current version of Figure 1 and Figure 4 with the following Replacement Figures 1 and 4.

A marked up copy of the current version of Figures 1 and 4 are attached as an appendix to indicate the changes from the objected to drawings.

The Applicants note that the submitted version of Figures 1 and 4 incorporates two changes from the previously submitted version. The first change (to Figure 1 only) added bolts 73 and flanges 75 to the internal ducts 52. This structure is discussed in the specification at page 5, lines 14-17, and in the above Specification Amendments.

The second change is made (to both Figures 1 and 4) in response to the Examiner's suggestion at page 4, Paragraph 3(d) of the outstanding Office Action. Accordingly, Item No. 74 is deleted and the internal ducts 52 do not show a spring 74.

REMARKS

The Office Action Summary of the Office Action mailed 5/15/2006, states that: Claims 1, 5-8 and 10-13 are pending in this application; Claims 7 and 8 were withdrawn from consideration; Claims 1, 5, 6 and 10-13 are rejected; and the specification is objected to and the drawings filed on 3/9/2006 are objectionable.

In addition, the Detailed Action Section of the Office Action mailed 5/15/2006 states:

(a) In Paragraph 3(d), that the Examiner's objection would appear to be overcome by amending the specification and Figures 1 and 4 to remove the indicia (74) from both the specification and the original Figures 1 and 4 as filed.

(b) In Paragraphs 5, 6 and 7, the specification was objected to under 35 USC 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention and Claims 1, 5-6 and 10-13 were rejected under 35 USC 112, first paragraph, as failing to comply with the enablement requirement and 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

(c) In Paragraph 8-9, independent Claims 1, 5 and 11 were rejected on the ground of nonstatutory obviousness-type double patenting.

(d) In Paragraph 10, Claims 1, 5-6 and 9 were rejected under 35 USC 103(a) as being unpatentable over US Patent No. 4,678,623 (Malandra et al.) for the reasons set forth in Section 13 of the 6/14/2005 Office Action.

(e) In Paragraph 11, Claims 1, 5-6 and 9 were rejected under 35 USC 103(a) as being unpatentable over Malandra et al. as applied in Paragraph 10 and further in view of US Patent No. 4,302,290 (Mazur et al.).

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(f) In Paragraph 12, Claims 1, 5-6 and 9 were rejected under 35 USC 103(a) as being unpatentable over The Simplified Head Assembly article from Westinghouse World View December 2002 alone or further in view of Mazur et al.

Re: Drawing Objections of Paragraph 3 of the Office Action

Figures 1 and 4 have been amended in accordance with the Examiner's suggestion of Subparagraph (d) to delete a reference to Item (74) and the depiction of a "resilient spring".

The Applicants respectfully submit that the use of a resilient spring arrangement is known in the nuclear field, which is illustrated by Figure 6 of US Patent No. 5,265,138. Figure 6 shows a pressurized water nuclear reactor pressure vessel having a spring 136 in a tube section 132 to be stabilized, which spring 136 is formed by deforming a web 140 extending between two axial slits 138 in the tube section according to the specification of US Patent No. 5,265,138 at Column 7, lines 13-21.

Re: The 35 USC 112, First and Second Paragraph,

Objections and Rejections of Paragraphs 5-7

With regard to the phrase "an upper end supported by the seismic support platform", which phrase appears in Claims 1, 5 and 11; the Applicants have deleted this phrase and substituted the phrase "an upper end extending through the seismic support platform" therefore. See, in this regard, the depiction in Figure 1 of an "upper end 34" extending through seismic support platform 26 and the discussion in the specification at page 4, lines 16-22.

The Applicants respectfully submit that engineers skilled in the art who design nuclear reactor vessels and appurtenant structures understand how seismic support platforms and control rod drive mechanisms function together. Thus, the Malandra et al. Patent states in the Background Section at Column 1, lines 58-60, that:

"A seismic support platform 28 is provided at the upper end of CRDM assemblies 16 for laterally restraining the CRDM assemblies 16 under seismic conditions," [Emphasis supplied.]

The Malandra et al. Patent again states, at Column 6, lines 24-27:

"As is well known, a seismic support platform provides lateral restraint for the CRDM assemblies 116 so as to prevent swaying or deflections thereof under, for example, seismic conditions, ..." [Emphasis supplied.]

Similarly, US Published Patent Application No. 2003/0026377 ("Baliga et al."), states at Paragraph 0075 on page 7 that:

"A seismic support system 1300 for the integrated head assembly 1100 is shown in Fig. 17. The seismic support system stabilizes the CRDMs 96 in a seismic event to ensure that the control rods are able to drop down into the reactor if it is necessary to shut the reactor down."

With regard to the phrase "each duct extending from a lower end ... to an upper end" (emphasis by the Examiner), which phrase appears in Claims 1, 5 and 11; the Applicants have amended Claims 1, 5 and 11 to state that each internal duct has a lower end and an upper end. Claim 1 has been further amended to more specifically recite that the lower ends of the internal ducts extend below the electro-magnetic coil stack assemblies (which is shown by Figure 1) and the upper ends extend above the seismic support platform (which is also shown by Figure 1). Similarly, Claim 5 has been further amended to recite that the lower ends of the internal ducts extend below the electro-magnetic coil stack assemblies and Claim 11 has been further amended to recite that the

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upper ends of the internal ducts extend above the seismic support platform. (Claim 5 also recites that the internal ducts extend through the seismic support platform and Claim 11 also recites that the internal ducts have lower ends disposed in the control rod drive mechanism plenum.)

With regard to the phrase "the internal ducts are supported by the upper plenum" as it appears in Claim 6; the Applicant's have amended Claim 6 to recite that "the internal ducts are bolted to the upper plenum". This arrangement is discussed in the specification at page 5, lines 16-17. The specification and Figure 1 have been amended to conform to this change.

With regard to the phrase "with the upper plenum supported by the upper leg member and the seismic support platform supported by the lower leg member" as it appears in Claim 6; the Applicants have amended Claim 6 to recite that the upper plenum is supported by the upper leg member and to recite that the seismic support platform is supported by the lower leg member.

With regard to the expression "L shape" and Claim 12; the Applicants have amended Claim 12 to state that the duct has a shape with reference to the cross-section of the duct within the seismic support platform. This is discussed in the specification at page 5, lines 7-10 and shown in Figure 2. The Applicants' respectfully submit that ordinarily skilled workers in the art who design air ducts would understand how to make and use a duct with a L shaped cross section.

With regard to the expression "rectangular shape" and Claim 13; the Applicants have amended Claim 13 to state that the shape is with reference to the cross-section of the duct. This is discussed in the specification at page 5, lines 7-10. The Applicants submit that ordinarily skilled workers in the art who design air ducts would understand that a rectangular shaped duct is a duct whose adjacent faces meet at right angles. See, e.g., Merriam Webster's Collegiate Dictionary, 10th edition.

The Applicants respectfully submit that the specifications and claims as amended meet the requirements of 35 USC 112, first and second paragraphs.

Re: The Double Patenting Rejection of Paragraphs 8 and 9 of the Office Action

The Applicants have amended Claims 1, 5 and 11 to state that "the missile shield [has] a plate superposed over and spaced from the inlet air openings of the upper plenum in air flow communication the upper ends of the internal ducts". This structure is shown in Figures 1 and 3. Malandra et al. does not claim an arrangement wherein a missile shield plate is disposed in an upper plenum directly over the upper plenum's inlet air openings which are in air flow communication with internal ducts.

The Applicants respectfully submit that the double patenting rejection is moot in view of this amendment.

Re: The 35 USC 103 Rejections of Paragraphs 10-12 of the Office Action

The Applicants have invented an improved integrated head assembly having internal air ducts disposed within a CRDM array for guiding cooling air as it flows between the electro-magnetic coil stack assemblies to overhead fan assemblies.

Independent Claims 1 and 5 recite that the internal air ducts have lower ends that extend below the electro-magnetic coil stack assemblies and Claim 11 recites that the internal air ducts have lower ends that extend into in the control rod drive mechanism plenum disposed below the electro-magnetic coil stack assemblies. Also, Claims 1, 5 and 11 recite that the Applicants' assembly includes a missile shield disposed in an upper (i.e., fan) plenum, which missile shield has a plate disposed directly above and spaced from openings in the upper plenum that are in air flow

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communication with the upper ends of the internal air ducts. Please see, in this regard, the curved air flow arrows extending from the upper ends 72 of the internal air ducts 52 into the upper plenum 54 below the missile shield plate 42. Advantageously, the missile shield plate functions as a shield during normal on-line operations by deflecting high velocity cooling air from the electro-magnetic coil stack assemblies and any entrained particles (e.g., pieces of insulation from the reactor vessel head) or liquid droplets (e.g., leakage from the top nozzles on the reactor vessel head) away from the blades of the fan assemblies 56.

Malandra et al. discloses a head assembly wherein the air ducts are external of the lower shroud surrounding the electro-magnetic coil stack assemblies. In addition, Malandra et al. discloses that the air ducts (i.e., fan ducts 140) extend through the missile shield 134. Thus, the Malandra et al. air ducts do not guide the cooling air as it flows through the electro-magnetic coil stack assemblies surrounded by the lower shroud. Also, the Malandra et al. missile shield does not obstruct the air flowing into the fan plenum from internal air ducts to protect the fan blades from any entrained particles.

Claim 6 is directed at a preferred embodiment of Claim 1 wherein the internal ducts are bolted to the upper (or fan) plenum and the upper plenum is supported by an upper leg member attached to a lower leg member by a clevis arrangement. The lower leg member also supports the seismic support platform. Advantageously, this structure enables air ducts that extend between the coil stacks can be removed along with the upper plenum and fans as a subassembly separate from the seismic support platform and control rod drive mechanisms. Malandra et al. does not disclose or suggest this structure.

Claim 10 is directed at an embodiment of Claim 1 wherein internal ducts that extend to between the electro-magnetic coil stack assemblies are backfit into an existing head assembly. Malandra et al. does not disclose or suggest this structure.

Claims 12 and 13 are directed at embodiments of Claim 11 wherein the internal ducts have cross-sections that are L shaped (Claim 12) or rectangular shaped (Claim 13). Advantageously, these shapes guide the cooling air while it is flowing between the control rod drive mechanisms. Malandra et al. does not disclose or suggest this feature.

The Applicants respectfully submit that the combined disclosures of US Patent No. 4,302,290 (Mazur et al.) and Malandra et al. as hypothesized do not disclose or suggest the Applicants' improved head assembly. Mazur et al. generally disclose a head assembly having exhaust ducts 70, 72 and 74 extending beyond the reactor vessel head from a lower plenum to an upper plenum. See, in this regard, Figure 1 and Column 11, lines 32-60. Mazur et al. and Malandra et al. do not teach ordinarily skilled engineers to extend air ducts into the region between electro-magnetic coil stack assemblies of a control rod drive mechanism array to guide the downwardly flowing cooling air or to superpose a missile shield plate directly over the upper end of the air ducts to obstruct the flow of particles entrained in the upwardly flowing air upstream.

The Applicants respectfully submit that the combined disclosures of the Westinghouse World View December 2002 article alone or in view of Mazur et al. Patent does not disclose or suggest the Applicants' improved head assembly. The Westinghouse World View article discloses an arrangement wherein the lower shroud is extended into contact with the seismic support platform whereas the Applicants lower shroud is spaced from the seismic support platform. Mazur et al. and the Westinghouse World View do not teach ordinarily skilled engineers to extend air ducts into the region between electro-magnetic coil stack assemblies of a control rod drive

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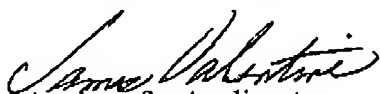
mechanism array to guide the downwardly flowing cooling air or to superpose a missile shield plate directly over the upper end of the air ducts to obstruct the flow of particles entrained in the upwardly flowing air upstream of fan assemblies.

Accordingly, the Applicants respectfully submit that their improved head assemblies of Claims 1, 5, 6 and 10-13 are patentable over the prior art of record.

Allowance of these claims is earnestly solicited.

The Commissioner is authorized to charge any additional fees required by 37 CFR 1.16 or 37 CFR 1.17 as a result of this Reply to Deposit Account No. 50-0947.

Respectfully submitted,


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APPLICATION NO. 10/670,540
 REPLY TO OFFICE ACTION OF MARCH 27, 2006
 REPLACEMENT SHEET

MAY 15, 2006

CHANGES

- ① ADDED BOLTS 73
 IN DUCT FLANGES 75
- ② DELETED SPRINGS 74

CHANGE

① 2

CHANGE

② 2

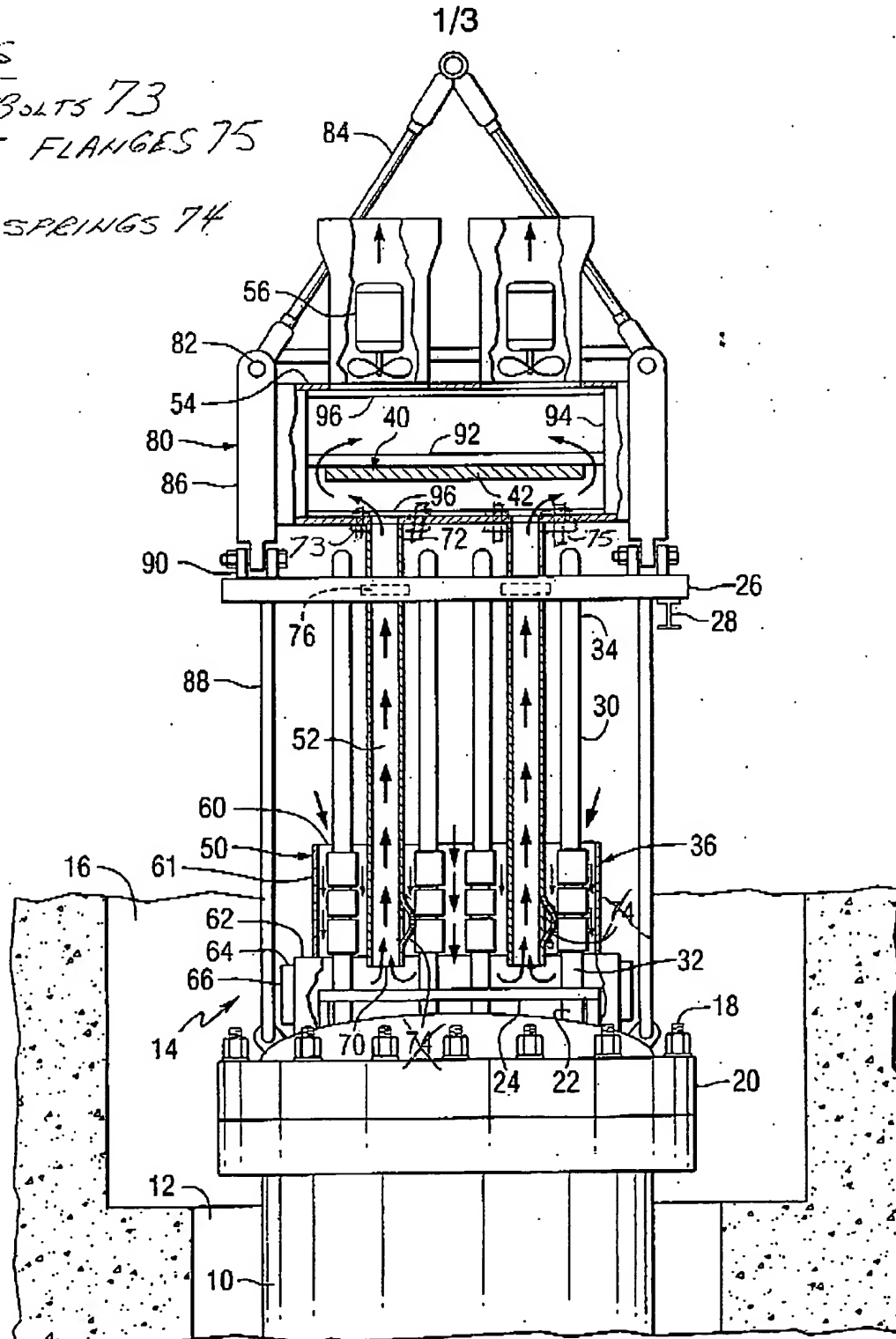


FIG. 1

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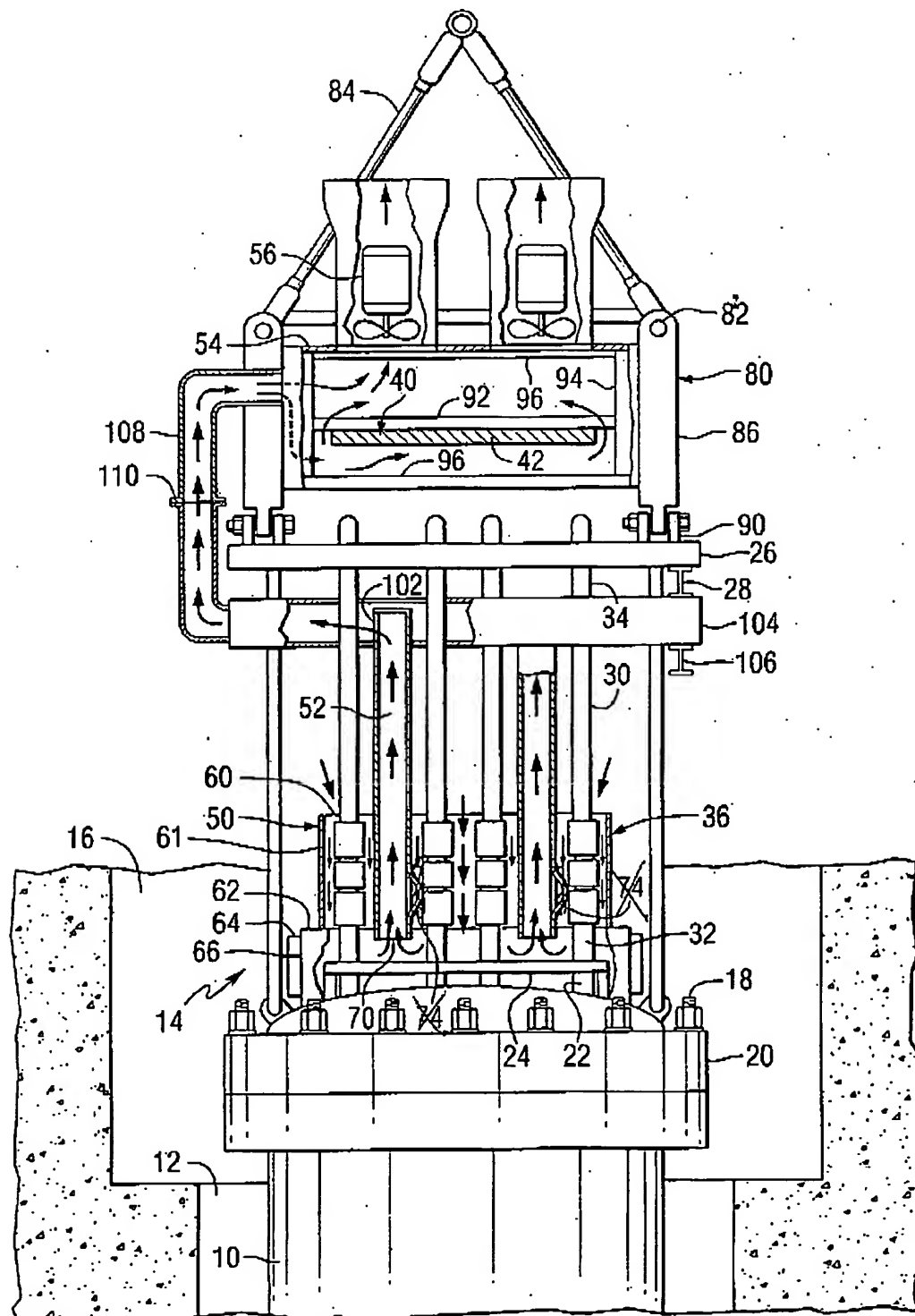


FIG. 4